Omic sciences in Catalonia: Technology Snapshot

ACCIÓ
Government of Catalonia

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1. Definition of Omic Sciences and their Importance to Industry
Definition of Omic Sciences

What are they?
Omic sciences are a set of disciplines related to biochemistry and molecular biology through which in-depth knowledge can be achieved, in analytical terms, of the features and global content of a biological sample.

What are they based on?
Omic disciplines focus on the study of a specific kind of biomolecules; so, for example, genomics analyses genes or genomes, while proteomics focuses on the identification and quantification of all proteins and peptides.

The joint processing of this information provides an integrated view of the biology of the sample, as well as of the biochemical processes that take place within it as well as allowing identifying the involvement of the different molecules, incorporating the data of each of the different layers of information.

How important are they?
Omic sciences provide major advances in the basic understanding of biological issues. They also represent a huge development in the field of the analysis of cell functionality and their biotechnological applications, and also become a key tool for innovation in sectors where products or substances of biological origin play an important role, such as the food industry, the environment, health and biotechnology research.
Importance of Omic Sciences to Industry

**Innovation**
Omic sciences create opportunities of innovation for companies in different fields and sectors, particularly in the food and pharmaceutical industries with the characterization of new biotechnology products.

**Expanded knowledge**
The integration of different omic sciences to any study provides broad and deep knowledge about the mechanism of action and system biology. This allows detecting new functional relations between biomolecules and thus allows the identification of new mechanisms of action and new treatment targets.

**Transversality**
Omic sciences can be applied in many sectors such as wellbeing and sport, agriculture, food, sustainability and health and nutrition.

**Speed**
Leading technologies that accompany omic sciences allow obtaining large amounts of data in a short time, increasing the speed with which knowledge is generated.
2. Omic Sciences Worldwide
Global Leaders in Omic Sciences: Key Players
World Omic Sciences Market

GENOMICS

In 2016, the world market was valued at approximately $13,450 M, with an expected annual growth rate of 10.2% to reach $23,880 M in 2022.

The growth of this market is attributed to factors such as:

- Increased personalized treatments.
- Increased public and private investment.
- Increasing applicability of genomics in the field of diagnostics.

In the European context, in 2015, Next-Generation Sequencing (NGS) services had a market of $444M and it is expected to reach $1,152M in 2020. It is one of the techniques of preference with regard to sequencing due to its speed and efficiency in relation to cost.

TRANSCRIPTOMICS

Regarding transcriptomics, in 2013 it had a market valued at $1,743.2 M. With a view to 2019, an annual growth rate of 13.7% is foreseen, reaching a figure of $3,773 M by 2019.

The main factors to explain this forecast are:

- Technological progress in the field of omics and the application of sequencing technologies and RNA analysis.
- Increased public and private investment. The formation of biotech companies.
- The application of RNA analysis in the search for biomarkers (personalized medicine).

Source: Markets and Markets
World Omic Sciences Market

**PROTEOMICS**

The expected growth for the proteomics market between 2016 and 2021 is 11.7% per annum, expected to reach a figure of $21,870M by 2021. The main factors that favour this forecast are:

- The increase in personalized treatments.
- The applicability of proteomics in the field of diagnostics and the discovery of new drugs.

**METABOLICOMICS**

The forecast annual market growth rate for the same period is 14.6%, reaching $2,390 M in 2021.

This market's potentiality is strengthened by:

- The need for more accurate diagnoses.
- The demand for personalized medicine and treatment.
- Technological progress and the promotion of biotechnological research by private companies and public bodies.

**Limitations to the growth of the markets**

High equipment costs + Lack of specialized researchers

Source: Markets and Markets
3. Omic Sciences in Catalonia
Omic Sciences in Catalonia: Main Mapping

Conclusions

- 24 companies
- €80M turnover related to omic sciences
- 1,160 employees
- 95.8% are SMEs
- 1 in 3 companies (33%) have a turnover over €500,000
- It is an emerging sector: 46% of companies are under 5 years of age

Companies in the process of internationalization

- 12.5% of companies have subsidiaries abroad
- 37.5% of companies export

Main specializations (according to the number of companies):
1. Genetic tests (42%)
2. Genomics (25%)
3. Bioinformatics (13%)

Source: authors' own following Orbis, ACCIÓ, Eurecat and Barcelona and Catalonia Start-up Hub Directories.
# Ecosystem and agents map of Omic Sciences in Catalonia

## Partial illustrational table

<table>
<thead>
<tr>
<th>Associations</th>
<th>TECNIO centres</th>
<th>University programmes</th>
<th>Research centres</th>
<th>Infrastructures</th>
<th>Fairs</th>
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<td>University Pompeu Fabra</td>
<td>cnag</td>
<td>Barcelona Supercomputing Centre</td>
<td>11TH ANNUAL PARTNERING CONFERENCE</td>
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### SECTORS OF APPLICATION

- Agriculture
- Food
- Wellbeing and sport
- Health and nutrition
- Sustainability

### COMPANIES

- AB-Biotics
- Anaxomics
- Aromics
- Skin Genomic Center
- Rubió
- Genomic Genetics
- Nutren
- Qgenomics
- Microomics
- Oryzon
- Pangaea Oncology
- IMIDomics
- Inbiomotion
- Ascidea
- Sequentia

### STARTUPS

- Vetgenomics
- Smgenomics
- DnaNutricCoach
- InBiomotion
- Ascidea

### Note:
The use of these brands is merely for information purposes. The brands mentioned in this report belong to their respective owners and under no circumstances are they the property of ACCIÓ. This is a partial representation for the purpose of illustrating the main companies that belong to the omic sciences ecosystem in Catalonia, but other companies may exist that have not been included in the study.

Source: Authors’ own
4. Trends and Applications by Demand Sector
Trends in Omic Sciences

**TECHNOLOGICAL IMPROVEMENT**

- **Single-cell omics**
  Discovery of new cell processes and mechanisms that are masked when the approach is at tissue level.

- **Dried-fluid spots**
  Analysis of biomolecules from a single drop of body fluid (blood, urine, saliva, cerebrospinal fluid).

- **Big-data**
  Increase in bioinformatic tools for the integrated analysis of data from different omic sciences.

**PERSONALIZATION**

- **21st century medicine**
  Omic sciences allow developing optimized medicine to get early diagnosis and personalized treatment.

- **Microbiota**
  The new methods for analysing omic data can generate maps of the microbiota of each individual and their relationship with their health.

- **Personalized nutrition**
  The identification of genetic variants and metabolic predisposition allows formulating a diet plan tailored to each person.

**PRODUCT DEVELOPMENT**

- **Foodomics**
  All the information generated in the food sector thanks to omic sciences is applied to improve human and veterinary nutrition. Functional foodstuffs and nutritional supplements are developed.

- **Pharmacology**
  The integration of different omic sciences accelerates the discovery of molecular and metabolic mechanisms associated with diseases, increasing the possibility of detecting treatment targets and generating new drugs.
# Applications by Demand Sector

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<thead>
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<th>Application</th>
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<td>Discovery of new drugs</td>
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<td></td>
<td>Detection of predispositions to diseases</td>
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<td>Microbiota studies</td>
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<td>Personalized diets</td>
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<td>Intolerances</td>
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<td>Functional foods</td>
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<td>Diagnosis</td>
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<td>Detection of banned substances</td>
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<td></td>
<td>Enhanced performance</td>
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<td>Cosmetics</td>
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</table>
## Applications by Demand Sector

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</table>
| **Sustainability** | Bioleaching processes  
                          | Species identification  
                          | Soil detoxification  
                          | Monitoring and management of wild populations  
                          | Wastewater treatment  
                          | Biofuels |
| **Agriculture** | Selection of varieties  
                          | Pharmacology  
                          | Transgenic crops  
                          | Veterinary  
                          | Animal health and welfare  
                          | Alternatives to pesticides and fertilizers |
| **Food**        | Food safety  
                          | Fraud control  
                          | Toxicology |
5. Conclusions
Conclusions

Omic sciences

Applications

The omic sciences have a great potential for application in all sectors where living beings come into play, as they enable achieving in-depth knowledge of their biology as a whole.

Genomics

Considering the group of omic sciences, genomics is at the most advanced stage of knowledge. It was the first of these disciplines to develop and has received the most investments and effort to date.

Performance

In Catalonia, activities in omic sciences take place, mostly, in research centres operated by universities or foundations. These centres can offer their services both to research institutions and to the private sector.

Challenges

The rapid progress of knowledge and technology related to the omic sciences poses one of the challenges of the sector: the search for highly trained and specialized personnel.
See the full report here: